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1CAN010601

January 3, 2006

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: License Amendment Request
Request for Emergency Technical Specification Change to Revise the Actuation Allowable Value for Emergency Feedwater Initiation and Control Function (EFIC)
Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

Entergy Operations, Inc. (Entergy), Arkansas Nuclear One, Unit-1 (ANO-1) requests an emergency Technical Specification (TS) change to the Steam Generator (SG) Level – Low allowable value of Limiting Condition for Operation (LCO) 3.3.11, Emergency Feedwater Initiation and Control (EFIC) System Instrumentation. Operation at 100% power with the current allowable value involves an increased risk of spurious EFW initiation. Therefore, Entergy requests a revised TS allowable value of ≥9.34 inches and a limiting trip setpoint value of ≥10.42 inches in order to achieve and maintain 100% power operation. An actuation time delay of ≤10.4 seconds is also proposed to minimize the possibility of inadvertent actuations during anticipated transients such as main feedwater transients, a main turbine trip, etc.

Both ANO-1 Once Through SGs (OTSGs) were replaced during the 2005 fall refueling outage 1R-19. Both the original and new Enhanced OTSGs (EOTSGs) contain an adjustable flow orifice in the OTSG downcomer region. The primary function of this orifice is to ensure sufficient feedwater preheating and to provide flow stability during power operation. Based on the EOTSG design, the flow orifice in each SG was adjusted to establish a steam generator level, at full power operation, of approximately 65% of the Operate Range to ensure stability, prevent flooding of the aspirating ports, and maintain the inventory requirements for the Loss of Feed Water (LOFW) analysis.

The positioning of the adjustable flow orifice also impacts the EFIC Low Range Level instrumentation. These instruments provide for initiation of Emergency Feed Water (EFW) on low SG level as well as level control with EFW in operation. The instrument taps for the Low Range Level instruments are located at 6 inches and 156 inches above the upper face of the lower tube sheet. Since the orifice plate is located approximately 48 inches above the lower tube sheet, the Low Range Level taps span either side of the orifice plate in both the OTSGs and EOTSGs. The Low Range Level transmitters are calibrated for the static conditions in the downcomer during LOFW events and are density compensated for accident conditions. During power operations with Main Feed Water (MFW) in operation, the level transmitters are exposed to dynamic two phase (steam and water) flow in the downcomer as well as the additional

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pressure drop due to the flow across the orifice plate. These complex conditions are extremely difficult to model and were estimated for the EOTSGs using comparative analysis with the OTSGs as a baseline. This analysis accurately predicted the behavior of the EFIC High Range Level instruments and the Startup and Operating Range instruments used by the Integrated Control System (MFW flow control), but the EFIC Low Range Level instruments began to diverge from predictions as power increased above 70%.

In the original OTSGs while operating at 100% power, the EFIC Low Range Level instruments decreased to an indicated level of ~65 inches (actual SG level at 100% power is ~300 inches). Based on a comparative analysis, it was predicted that the EOTSG EFIC Low Range Level instruments would indicate ~55 inches. However, the EFIC Low Range Level instruments indicated ~18 inches at 98% power, approaching the in-plant EFW initiation setpoint of 13.5 inches. It is estimated that the indicated level at 100% power will be ~15 inches on the EFIC Low Range Level instruments. Due to normal level and instrument fluctuations, power is currently being administratively restricted to ~98% full power to establish sufficient margin between the EFIC Low Range SG indicated level and the EFW initiation setpoint. The administratively controlled EFIC low level setpoint has been changed to 13 inches to provide some additional operating margin. It is important to note that the level offset effects of the downcomer and orifice plate are only present with Main Feed Water in operation at middle to high power levels and disappear immediately upon a loss of normal feed water.

The condition described above does not impact the ability of EFIC to actuate EFW and control SG level following a reactor trip or during any anticipated operational occurrence (AOO) or design basis accident (DBA). Furthermore, lowering the SG Level – Low setpoint and adding a time delay in the actuation circuit as described above will not adversely impact the ability of the Emergency Feedwater (EFW) system to perform its design function and maintain associated plant parameters within the limits described in the ANO-1 Safety Analysis Report (SAR). The revised allowable value will allow ANO-1 to achieve 100% power operation while maintaining adequate margin to EFW actuation setpoint to prevent spurious and unnecessary EFIC initiation.

In accordance with 10 CFR 50.91(a)(5), an emergency TS change may be requested provided the condition that caused the emergency situation could not be avoided and would result in a plant shutdown, derate, etc. if timely action on the part of the licensee and NRC were not taken. To provide more margin against inadvertent actuation of the EFIC system, ANO-1 plant operation has been administratively derated to a power level of ~98% full power. Even though adjustments could be made to the orifice plates, Entergy believes that the current setting of the plates should not be changed until more detailed analysis is conducted. Entergy is performing additional evaluations on the overall EOTSG thermo-hydraulics to determine if future orifice plate adjustments are warranted. In addition, correcting this condition would require a plant shutdown to Mode 5 to support isolation of both SGs for repositioning of the flow orifice. Therefore, Entergy believes the request for emergency review and approval of the proposed TS amendment is justified. The basis for this determination is provided in Attachment 1. A markup of TS 3.3.11 is provided in Attachment 2.

There are no new commitments contained in this submittal. Should you have any questions, please contact David Bice at 479-858-5338.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 3, 2006.

Very truly yours,

JSF/dbb

Attachments
1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up)
3. Proposed Technical Specification Bases Changes Mark-Up (For Information Only)

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Attachment 1

To

1CAN010601

Analysis of Proposed Technical Specification Change

1.0 DESCRIPTION

This letter is a request to amend Operating Licenses DPR-51 for Arkansas Nuclear One, Unit 1 (ANO-1).

The proposed change will revise Technical Specification (TS) requirements associated with the Emergency Feedwater Initiation and Control (EFIC) System Instrumentation SG Level – Low allowable value.

2.0 PROPOSED CHANGE

The proposed change will reduce the Steam Generator (SG) Level – Low allowable value listed in Table 3.3.11-1 of TS 3.3.11, Emergency Feedwater Initiation and Control (EFIC) System Instrumentation, from ≥ 11.1 inches to ≥ 9.34 inches and establish a new "limiting trip setpoint" of ≥ 10.42 inches in order to allow ANO-1 to return to 100% full power following refueling outage 1R19. An actuation time delay is also established for this function to preclude inadvertent system actuations. The actuation time delay will be ≤ 10.4 seconds.

In addition, two footnotes are added to Surveillance Requirements (SRs) 3.3.11.2, Channel Functional Test and 3.3.11.3, Channel Calibration, which addresses the as-found and as-left condition of the EFIC instrument channel setpoints. Notes (c) and (d) are also added to Table 3.3.11-1 to address the limiting trip setpoint and time delays associated with the SG Level – Low function. A markup of the affected TS page is provided in Attachment 2 of this submittal. The ANO-1 TS Bases Control Program requires that relevant changes to the TS Bases be made under 10 CFR 50.59 following approval of this submittal. A markup of affected TS Bases pages is included in Attachment 3 of this letter for information only.

3.0 BACKGROUND

The design requirement of the Emergency Feedwater (EFW) System is to provide a minimum flow sufficient to remove heat load equal to 3½ percent full power operation. The system minimum flow requirement is 500 gpm. This takes into account a single failure, pump recirculation flow, seal leakage, and pump wear. The EFW System is designed to be in full operation within 60 seconds after receiving an actuation signal.

The EFIC System monitors the Once Through SG (OTSG) level and pressure, Main Feedwater (MFW) pump status, Diverse Reactor Overpressure Protection System (DROPS) / Anticipated Transient Without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC) actuation on loss of MFW flow, Reactor Coolant Pump (RCP) status, and Emergency Safeguards Actuation System (ESAS) Channels 3 and 4 in order to initiate Emergency Feedwater (EFW) or SG isolation should an actuation setpoint be reached. EFW is actuated to protect the core against the consequences of an overheating condition upon a loss of main feedwater or a loss of primary side forced circulation (loss of all four RCPs).

The EFW protective function is actuated by any of the following eight conditions:

1. "A" SG Low Level
2. "B" SG Low Level
3. "A" SG Low Pressure
4. "B" SG Low Pressure
5. Loss of both MFW Pumps
6. Loss of all four RCPs
7. ESAS Actuation
8. DROPS/AMSAC Actuation

The DROPS/AMSAC turbine trip and EFW initiation signals are generated when MFW flow is less than 15 percent in both loops and when reactor power is greater than 45 percent. The loss of both MFW pumps is detected by MFW pump turbine control oil pressure and is bypassed below 10 percent reactor power.

EFIC actuation will occur in support of various plant transients or accident conditions and it is likely such actuation will occur based on an input parameter other than low SG level. For example, EFIC actuation on a feedwater line break is initiated by low SG pressure. For the purposes of this submittal, therefore, discussion will be limited to those events relying on the SG Level – Low instrumentation, i.e. loss of feedwater events.

During normal operation, feedwater enters the steam generators through 32 MFW nozzles located around the main feedwater header as shown in Figure 1. The feedwater is pre-heated as it enters the downcomer region of the OTSG by aspirating steam (Figure 2). Aspirating steam will preheat the feedwater from an inlet temperature of ~460 °F to saturation temperature of ~535 °F (930 psig) prior to the feedwater entering the tube bundle region. Feedwater pre-heating reduces the thermal stresses placed on the lower tubesheet and reduces the amount of energy required for changing a saturated liquid into superheated steam in the tube bundle region.

As plant power is increased above 15%, OTSG level is ramped upward by feedwater control systems. During power operation, OTSG level is determined by the differential pressure between lower and upper OTSG level taps of various level instruments. As shown in Figures 3 and 4, the upper tap for the EFIC Low Level range is located in the downcomer at a measured level of 156 inches referenced to the upper face of the lower tubesheet, well below the OTSG level corresponding to 100% full power (~300 inches). At the point at which this upper level tap is covered with water, the differential pressure between the lower and upper level taps due to change in fluid height ceases (i.e., indicated level will plateau since any further increase in pressure due to an increase in water column height will be equally sensed by both the lower and upper level taps). It is at this point that changes in differential pressure become dependent on the pressure drop across the adjustable flow orifice located in the SG downcomer region between the upper and lower EFIC low range level taps. Because the lower level tap is downstream of this orifice (Figure 3), as flow increases (due to increasing plant power), the pressure sensed at the lower tap becomes increasingly lower in relation to that sensed at the upper tap due to the pressure drop across the flow restricting orifice. Thus, as the differential pressure increases in this manner, the indicated low range EFIC level instrument trends downward as power is increased from ~70% to 100% full power. However, the two phase flow conditions (steam and water) present in the lower regions of the downcomer make it difficult to predict the exact impact of adjustments to the flow orifice on the EFIC level instruments and the downcomer water level.

Both ANO-1 OTSGs were replaced during the fall 2005 refueling outage 1R19. On both the original and Enhanced OTSGs (EOTSGs), an adjustable orifice plate, located in the downcomer of each SG, regulates flow through the steam generator. The adjustable orifice plate is used to ensure the steam generators are operated in a stable, oscillation free, condition. As discussed in Section 5.3 the new orifice plates were slightly modified. The adjustable orifice plate is positioned to ensure the correct ratio of pressure drop compared to the inherent pressure drop through the tube support plates in order to maintain a stable operating level. Due to the minor differences in design between the original OTSGs and EOTSGs, an evaluation was performed to determine the correct adjustment of the orifice plate in the EOTSGs for stability and maintaining adequate inventory while avoiding flooding of the aspirating ports. As described above, the adjustment of this orifice plate also impacts the EFIC Low Range Level indication. With the original OTSGs, the indicated EFIC Low Range Level was~65 inches at full power (actual SG level at full power is ~300 inches). During power ascension following 1R19, the EFIC Low Range Level instruments provided an indicated level of ~18 inches at 98% power, compared to the predicted output of ~55 inches at 100% power. Extrapolated to 100% power it is estimated that the indicated level would be about 15 inches. This level indication is very close to the current in-plant EFIC actuation setpoint of 13 inches SG level. Even minor changes in main feedwater flow can cause inadvertent EFW actuation.

The EFIC High Range Level indication overlaps with the upper band of the EFIC Low Range Level indication described above. Both the EFIC High Range Level indication and the Operating Range Level indications that input to the normal MFW control system, have lower level taps that are above the orifice plates in the EOTSGs. Therefore, the orifice plate in the downcomer region of the EOTSGs has minimal impact on these indications.

The above described EFIC Low Range level error between ~70% and 100% full power has no impact on the point at which EFIC will actuate or on the design response of the EFIC system. Following a reactor trip, a reduction in power, or an accident, as MFW flow decreases, the differential pressure due to the pressure drop across the flow orifice is rapidly reduced. This removes the dynamic flow-related affect on indicated level and makes it dependent upon differential pressures created by the difference in water column height. Thus, the phenomenon associated with decreasing indicated water level between 70% and 100% power is eliminated, and EFIC actuation may occur based on actual lowering of SG level. This is also the case for the level control function of EFIC. The control setpoints (31 inches with RCPS running) will not be impacted as the level phenomenon is not present when there is no main feedwater flow. EFW is injected directly into the tubesheet area and does not flow in the downcomer region of the SG, and does therefore not contribute to the differential pressure effect on the Low Range EFIC instrumentation.

The EOTSGs are further described in Section 4.2.2.2 of the ANO-1 Safety Analysis Report (SAR). The EFIC system is further described in Section 7.1.4 of the ANO-1 SAR. The EFW system and the assumptions used in the analysis of the system are further described in Section 10.4.8 and 14.3 of the ANO-1 SAR. TS 3.3.11, 3.3.12. 3.3.13, and 3.3.14 Bases also provide detailed information related to the EFIC system.

On December 22, 2005, Entergy exited the 1R19 refueling/OTSG replacement outage and resumed power operation. On December 26, 2005, the ANO-1 reactor tripped from ~95% power due to a problem in the Main Turbine lubricating oil system. Repair of the malfunctioning non-safety related components required entry into Mode 4 conditions. To make adjustments to the orifice plate during this outage would have required further cooldown to Mode 5, draining the feedwater piping and SGs, preparing procedures, and relocating needed offsite contract support to the site. While these actions could have been taken, Entergy believes that without further evaluation and independent verification of new orifice settings, the condition may not have been corrected and could have resulted in unstable feedwater operation. Therefore, more time is required to perform additional analysis before making any adjustments to the orifice plate. This is necessary for higher confidence of correcting the low range level indication phenomenon without creating an unstable flow condition in the EOSTG. Therefore, no near-term adjustment to the orifice plate is considered appropriate until further detailed evaluation of the thermo-hydraulics of the system is completed.

4.0 TECHNICAL ANALYSIS

The EFIC SG Level – Low instrumentation acts only to actuate the EFW system and does not provide a reactor trip or any other Reactor Protection System (RPS) or Emergency Safeguards Actuation System (ESAS) input. As described in the Background section above, the indicated EFIC Low Range Level phenomenon being experienced above ~70% full power has no impact on safety system response to any postulated event, transient, or accident. However, because the low range indication approaches the EFIC actuation setpoint at full power, operation above ~98% full power could result in an inadvertent and unnecessary EFIC actuation. Such an actuation would result in a small transient in plant operating parameters, including reactor power, which will be affected by the injection of cooler and more dense EFW into the SGs. Operator response would be required to secure the EFW flow to the SGs, disabling automatic actuation of both EFW trains for short durations. In this condition, EFW would not be available to respond automatically if an actual accident condition presented itself.

To minimize the potential for inadvertent actuation of the EFIC system, ANO-1 plant operation is currently being restricted to a power level of ~98% full power. As described above, significant outage time would be required to perform a readjustment of the orifice plate. Therefore, Entergy is seeking a small reduction in Table 3.3.11-1 SG Level – Low allowable value of TS 3.3.11, Emergency Feedwater Initiation and Control (EFIC) System, to allow ANO-1 to return to full power operation. In addition, an actuation time delay of ≤ 10.4 seconds is proposed. During evaluation of the aforementioned instrument response, a review of past trends indicated that several anticipated plant transients, such as certain main feedwater transients or a main turbine trip could result in the EFIC Low Range Level instrument indicating slightly below the limiting trip setpoint for periods of up to 7 seconds. However, if a total loss of main feedwater were to occur, EFIC low steam generator level setpoint would actuate EFW upon time out of the time delay. In this event EFW will actuate well within the time assumed in the accident analysis, i.e. 80 seconds total from the time the steam generator level reaches 6 inches above the top of the lower tube sheet. Therefore, the above time delay was chosen to provide added margin based on available data to protect against inadvertent actuations. These transients are momentary and can provide false indication of low level which do not require EFW to mitigate the condition. Note (d) is added to TS 3.3.11 Table 3.3.11-1 to describe the time delay included in the derivation of the SG Level – Low setpoints. A summary of analysis supporting the setpoint change is included below.

The transients described in ANO-1 SAR Chapter 14 that result in automatic EFIC actuation are loss of AC power (on loss of RCPs), small break LOCA (also on loss of RCPs due to loss of AC power), and LOFW. The SG level low actuation setpoint is credited in the mitigation of the LOFW event. Therefore, the re-analysis of lowering the TS allowable value and adding the time delay was focused on meeting all safety criteria associated with a LOFW event. The acceptance criteria for the LOFW event relate to peak Reactor Coolant System (RCS) pressure, fuel failure (including offsite dose consequences), and SG tube loading. The peak RCS pressure occurs in the lower plenum region of the reactor vessel and must remain within 110% of design pressure (2500 psig), or 2750 psig. Fuel failure is associated with departure from nucleate boiling and the resultant offsite dose consequences. Compliance is demonstrated by showing that the core power does not exceed 112% of rated power with the reactor coolant pump operating. SG tube loading is controlled by limiting the maximum tube-to-shell average temperature difference (RCS temperature above shell temperature) to within 60 °F.

An evaluation of the reduced allowable value employed the RELAP5/MOD2-B&W plant model with the EOTSGs modeled (Reference 2). For the analysis associated with the reduced SG Level – Low allowable value and time delay, the model was initialized at 102% of 2568 MWt and a low initial SG level of 62% operate range was assumed. No loss of offsite power was assumed, thus the RCPs continue to operate, adding heat to the primary system. EFIC is assumed to actuate at 6 inches indicated level (6 inches above the upper face of the lower tube sheet) as compared to the analysis of record assumption of 8 inches. A failure of the motor-driven EFW pump is also assumed. The remaining EFW flow is split between the two EOTSGs and is assumed to be 500 gpm, conservatively lower than the design flow rate of 700 gpm (Reference 1). The boundary conditions and modeling techniques followed the guidance outline in Appendix A of BAW-10193P-A (Reference 3) using the initial conditions as identified in Table 1. The time delay required for EFW delivery to the EOTSG was increased from 60 to 80 seconds to allow for increases in the needed delay associated with actuation of EFW.

The analysis assumes MFW flow is ramped downward from full to zero flow over 7 seconds. This time considers loss of MFW flow due to pump failure as well as isolation valve closure. The reactor trips 9 seconds later on high RCS pressure as the initial SG inventory is boiled off. The pressurizer code safety valves lift to relieve excess pressure at this point and peak RCS pressure of ~2704 psig is reached. As the post-trip core power decreases the rate that the SG inventory is boiled off decreases. After approximately 83 seconds, the SG level reaches the EFIC low level actuation setpoint modeled in the analysis. With no SG heat removal, the RCS temperature increases due to residual core decay heat and the heat addition from the RCPs. At approximately 163 seconds, 80 seconds from the low level actuation setpoint, the flow from a single EFW pump provides 500 gpm of flow split between the two SGs. There is no EFW flow delivery to the SGs assumed during the 80 second delay time. This delay time considers EFIC system processing (including initiation time delays), pump start and time to reach full speed conditions and valve opening times. This flow is initially not sufficient to remove the core decay heat and reactor coolant pump heat. By approximately 10 minutes, core decay heat has decreased sufficiently that the heat absorption of the EFW flow exceeds the net heat addition to the RCS. The RCS temperature and pressure begin to decrease and the event can be terminated. The input parameters, initial conditions and sequence of events are provided in Tables 1 through 3, respectively. Plots of key system parameters are included in Figures 5 through 12 (extracted from the revised RELAP5/MOD2 analysis).

With the peak RCS pressure maintained below the aforementioned limit of 2750 psig, the acceptance criteria for this parameter is met for an EFIC initiation occurring at 6 inches above the top of the lower tube sheet. Core power does not significantly increase even with the assumed slightly positive moderator temperature coefficient. Therefore, the minimum departure from nucleate boiling ratio will not change. Once the reactor trips, the DNBR will decrease and thus, no fuel failure will occur. Given no fuel failures, no new offsite dose calculation is required.

With regard to SG tube loading, the tubes are relatively thin and tube temperature follows RCS temperature. The SG shell is relatively thick and the temperature of the shell will not change significantly during the LOFW event. This results in the tubes remaining in a state of compression. The greater the temperature difference between the tubes and the SG shell, the greater the potential for tube bowing. For the EOTSGs, the transient imposed by normal plant heatup is most limiting. The results of this analysis indicated a peak tube-to-shell differential temperature of ~45 °F. Therefore, the acceptance criterion for this parameter is met for an EFIC initiation occurring at 6 inches above the top of the lower tube sheet.

As depicted above, an analytical setpoint of 6 inches above the top of the lower tube sheet meets all criteria necessary to ensure reactor safety is maintained. The TS allowable value, however, includes a 0.5 inch additional margin above the analytical limit along with the addition of instrument uncertainties. These uncertainties are calculated in accordance with Method 3 of ISA-RP67.04.02-2000. NRC letter dated August 23, 2005, "Instrumentation, Systems, and Automation Society (ISA) S67.04 Methods for Determining Trip Setpoints and Allowable Values for Safety-Related Instrumentation" was also considered in the calculation of setpoints and the proposed changes to the affected TS pages. Based on these methods, an allowable value of 9.34 inches was determined appropriate. Instrument drift, instrument tolerances, and calibration uncertainties are included in the derivation of the allowed difference between the allowable value and the proposed limiting trip setpoint of 10.42 inches (Reference 4).

In addition, Entergy has reviewed the NRC staff position in their letter to NEI dated September 7, 2005, "Technical Specification for Addressing Issues Related to Setpoint Allowable Values." This letter provides an allowance to evaluate and reset a "limiting trip setpoint" found out of tolerance without declaring the channel inoperable, provided the out of tolerance condition did not exceed the "allowable value" (analytical limit with specified uncertainties). To adopt the NRC-recommended notes associated with the SRs for 3.3.11.2, Channel Functional Test and 3.3.11.3, Channel Calibration an additional Note (c) is proposed to Table 3.3.11-1 describing the "limiting trip setpoint" for the SG Level – Low function only. In accordance with ISA-RP67.02.04-2000, drift, calibration uncertainties, and uncertainties observed during normal operations are included in the development of the SG Level – Low "limiting trip setpoint." The addition of the various notes are consistent with the intent of the aforementioned September 7, 2005 letter given the current state of the ANO-1 Limiting Safety System Setting (LSSS) -related TSs. This submittal does not attempt to address the ongoing NRC-industry (NEI) joint effort to revise all LSSS-related TSs.

The current TS Bases require a channel to be declared inoperable if the "allowable value" is found to be out of tolerance during performance of the Channel Functional Test and the Channel Calibration SRs. This requirement will be maintained for all Table 3.3.11-1 functions. The associated Bases are being revised to include discussion consistent with the aforementioned September 7, 2005 letter in relation to the SG Level – Low function only with regard to its "limiting trip setpoint." A markup of the TS Bases is included in Attachment 3 of this submittal for information only.

The EOTSGs contain a greater secondary volume and therefore, afford greater operating margin for a LOFW event than the original OTSGs. Reducing the TS SG Level – Low allowable value to ≥ 9.34 inches and establishing a limiting trip setpoint of ≥ 10.42 inches continues to maintain associated accident analysis limits without reliance on extraordinary measures or operator action. The revised allowable values for both the SG Level- Low and the delay time will continue to enable the EFW system to maintain plant parameters within SAR limits for the previously evaluated accidents. Reducing the aforementioned allowable value in conjunction with establishing an actuation time delay also aids in avoiding inadvertent EFIC actuation at full power, a derate of the ANO-1 unit, and a shutdown to adjust the orifice plate. Because the revised low SG level allowable value and time delays continues to support all safety limits and analyses described in the SAR, unnecessary plant risk associated with a unit shutdown or an inadvertent actuation of the EFIC system is avoided with no additional risk to normal plant operations. Based on these conclusions, Entergy believes the reduced allowable value, the proposed limiting trip setpoint, and the proposed actuation time delay are acceptable.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. Entergy has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the Technical Specifications (TS), and do not affect conformance with any General Design Criterion (GDC) differently than described in the Safety Analysis Report (SAR).

5.2 No Significant Hazards Consideration

Entergy proposes to reduce the Steam Generator (SG) Level – Low allowable value from ≥ 11.1 inches to ≥ 9.34 inches and establish a limiting trip setpoint of ≥ 10.42 inches in order to accommodate Arkansas Nuclear One, Unit 1 (ANO-1) return to 100% full power following refueling outage 1R-19. In addition, an actuation time delay of ≤ 10.4 seconds is proposed to aid in avoiding inadvertent actuations resulting from anticipated and momentary transients such as the Main Feedwater pump overspeed or a Main Turbine trip. The proposed changes modifies the allowable value and limiting trip setpoint in which the Emergency Feedwater Initiation and Control (EFIC) System will actuate upon low SG level. This change is needed due to an indicated level error associated with the EFIC Low Range Level instrumentation that cannot be corrected during power operation.

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. *Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?*

   Response: No.

   The allowable value for actuation of the EFIC system is not an accident initiator and, therefore, cannot increase the probability of an accident. The EFIC and associated Emergency Feedwater (EFW) systems are components credited to mitigate the consequences of an accident. However, the small reduction in the SG Level – Low allowable value in conjunction with the addition of an actuation time delay still affords ample volume in the SGs to remove decay heat in a timely manner from the Reactor Coolant System (RCS) following a design basis accident described in the ANO-1 Safety Analysis Report (SAR). The revised allowable values for both the SG Level- Low and the delay time will continue to enable the EFW system to maintain plant parameters within SAR limits for the previously evaluated accidents. The analysis results do not impact the dose consequences of any accidents previously analyzed.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change to the TSs does not require any physical alteration to the plant or alter plant design, other than the slight reduction in SG Level – Low allowable value and the addition of an actuation time delay, as associated with EFIC actuation. The proposed change does not present a significant adverse impact on the EFIC function or EFW systems as credited in any safety analyses for the prevention or mitigation of any accident. The proposed change is associated with mitigating systems and the change cannot, in itself, initiate an accident of any type.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The proposed change does not significantly impact a margin of safety for any accident previously evaluated. Based on the revised safety analysis, the proposed change in EFIC low level initiation and the addition of an EFW actuation delay time will still assure adequate margin for EFW actuation under a Loss of Feedwater event, but will minimize inadvertent EFW actuation due to other plant transients.

   Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, Entergy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.3 <u>Basis for Emergency Circumstances</u>

10 CFR 50.91(a)(5) states:

> *Where the Commission finds that an emergency situation exists, in that failure to act in a timely way would result in derating or shutdown of a nuclear power plant, or in prevention of either resumption of operation or of increase in power output up to the plant's licensed power level, it may issue a license amendment involving no significant hazards consideration without prior notice and opportunity for a hearing or for public comment. In such a situation, the Commission will not publish a notice of proposed determination on no significant hazards consideration, but will publish a notice of issuance under § 2.106 of this chapter, providing for opportunity for a hearing and for public comment after issuance. The Commission expects its licensees to apply for license amendments in timely fashion. It will decline to dispense with notice and comment on the determination of no significant hazards consideration if it determines that the licensee has abused the emergency provision by failing to make timely application for the amendment and thus itself creating the emergency. Whenever an*

emergency situation exists, a licensee requesting an amendment must explain why this emergency situation occurred and why it could not avoid this situation, and the Commission will assess the licensee's reasons for failing to file an application sufficiently in advance of that event.

The original OTSG orifice plates contained 3/4" gaps and were only adjustable between fully closed (0% open) and 25% open. Operating at greater than 25% open resulted in excessive OTSG instability. In an effort to provide more adjustability of the EOTSG orifice plates while maintaining flow stability, the design value of the radial gap between the plate OD and shell ID was reduced to 5/8". It was also desired to set the EOTSG orifice plates such that the operate range was similar to that of the original OTSG. The OTSG operating ranges (unfouled) are on the order of 55% to 60%. The minimum required operate range is 50%, and the maximum inventory from flooding of the aspirator ports is 80%. Based on reducing the potential of being less than 50% or greater than 80%, a target operate range of 65% was selected. The 65% target value also provides calculated stability ratios that are improved from those of the original OTSG.

The RELAP5 thermal hydraulic computer code was used to model both the original OTSGs and EOTSGs using plant startup and operating level data. Data taken at 98% power during startup after 1R19 agreed well with these predictions. However, RELAP5 predictions of the OTSG EFIC Low Level response are not as easily predictable. This is due to difficulties in computing localized void distributions in unheated (non-boiling) regions (i.e. EFIC instrument span) rather than large heated regions that occur over the startup and operating ranges.

As a result, EFIC Low Level predictions for the EOTSG were performed on a comparative basis. OTSG EFIC level data was adjusted by the difference in EOTSG and orifice plate resistance. This adjustment assumed design dimensions for the orifice plates and shell dimensions and also assumed that the OTSG orifice plate was fully closed. Based on a relatively small difference in orifice plate pressure losses, only about a 10-inch difference in level was predicted at 100% power versus the approximately 50 inches experienced. Therefore, the reduced operating margin for the EFIC Low Level trip was not able to be readily foreseen.

Therefore, in accordance with 10 CFR 50.91(a)(5), an emergency TS change is considered appropriate to avoid continued derate of ANO-1 and to allow on an expeditious resumption of power to 100%. Based on the above, Entergy believes the conditions for an emergency TS change are met.

5.4 <u>Environmental Considerations</u>

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 PRECEDENCE

The proposed change is unique to the ANO-1 design and now precedence is know to exist.

7.0 REFERENCES

1. ANO-1 Safety Analysis Report

2. AREVA/Framatome ANP Document 86-9009698-000, *ANO-1 Revised EFIC Low Level Setpoint Summary Report*

3. AREVA/Framatome ANP Document 43-10193PA-00, *RELAP5/MOD2-B&W for Safety Analysis of B&W-Designed Pressurized Water Reactors, BAW-101-10193P-A*, SER dated October 15, 1999

4. ER-ANO-2005-0871-000, *ANO-1 EFIC Low Level Initiate and Time Delay setpoint Change*

Table 1. Key Inputs and Boundary Conditions

RCS Conditions	
NSSS Power	102% of 2568 MWt (2619.4 MWt)
Pump Power	5 MWt/pump
Decay Heat	1.0 x ANS 1971 + B&W Heavy Actinides
Primary Side Tave	579 F
RCS Pressure	2170 psia
RCS Flow Rate (Thermal Design Flow)	380,000 gpm
Pressurizer Parameters	
Pressurizer Level	248.83 (220 inches + 28.83 inches)
Pressurizer Sprays and Heaters	Not Modeled
PSVs Lift Setpoint	2500 psig + 3%
PSV Capacity	324,000 lbm/hr/valve @ 2575 psig
PORVs	Not Modeled
Main Feedwater System Parameters	
MFW Temperature	460 F
MFW Flow per SG	Nominal for core power level (~1550 lbm/sec)
MFW Isolation Signal	Initiating Event
MFW Valves Stroke	7 second ramp
Steam Generator Parameters	
Steam Generator Tube Plugging	Zero Tube Plugging - EOTSG
Steam Generator Level	62% OR
EFIC Low Level Actuation Setpoint	6 inches (above tube sheet)
EFW Flow	500 gpm (total) – split equally between SGs
EFW Temperature	120 F
EFW Actuation Delay Time	80 seconds
Turbine and Main Steam Parameters	
MSSV Modeling (Lowest set valve is assumed to be out of service on each SG)	Nominal settings with +3% lift tolerance and +3% accumulation
Turbine Trip Delay Time (TSV closure)	One Time Step
Core Kinetics Parameters	
Doppler Coefficient	-1.3×10^{-5} Δk/k/F (LOFW) -2.0×10^{-5} Δk/k/F (EFIC)
Moderator Temperature Coefficient	$+0.13\times10^{-4}$ Δk/k/F (LOFW) -4.00×10^{-4} Δk/k/F (EFIC)
Shutdown Margin	1% Δk/k
Prompt Neutron Generation Time	17.5×10^{-6} sec
Delayed Neutron Fraction	0.007
RPS Trip Setpoints	
High RCS Pressure	2400 psia
High Pressure Trip Delay Time	0.6 seconds
High Power	112% of 2568 MWt (2876.16 MWt)
High Power Trip Delay Time	0.4 seconds

Table 2. EOTSG Initial Conditions

Parameter	Target	Value
T-ave, F	579	578.7
RCS Pressure, psia (HL tap)	2179	2178.4
PZR level, inches	248.8	248.9
SG Operate range, %	60 – 63	61.7, 62.2
Pressure at turbine, psia	900	900
MSL ΔP, psi	25 – 30	26.8 27.9
MFW temperature, F	460	460
superheat steam temp, F	590 – 600	594.72 594.29
MFW flow, lbm/s	1500 – 1550	1543.8 1548.8
RCS flow, lbm/s	20,140	19,653 19,657

Table 3. Sequence of Events for the EOTSG LOFW Analysis

Description		
MFW Pump Trip	sec	0.0
MFW Ramp Down	sec	7.0
PZR Spray Activated	sec	n/a
Reactor Trip	sec	17.21
Control Rods Insert	sec	17.81
PSVs Open (first time)	sec	~20
Low SG Level Setpoint	sec	82.68 82.91
EFW Flow Initiated	sec	162.69 162.92
Analysis Terminated	sec	1000
Peak RCS Pressure	psia	2703.47
Time of Peak Pressure	sec	~20
Peak PZR Level [1]	inches	407.1
Time Peak PZR Level	sec	~630
Peak RCS T_{ave}	F	609.1
Time of Peak T_{ave}	sec	460
Peak T-S Temp Difference	F	~45
Time of Peak ΔT	sec	~300

Notes:

1. A liquid solid pressurizer corresponds to 415.1 inches.

FIGURE 1! OTSG DETAIL (MINOR)

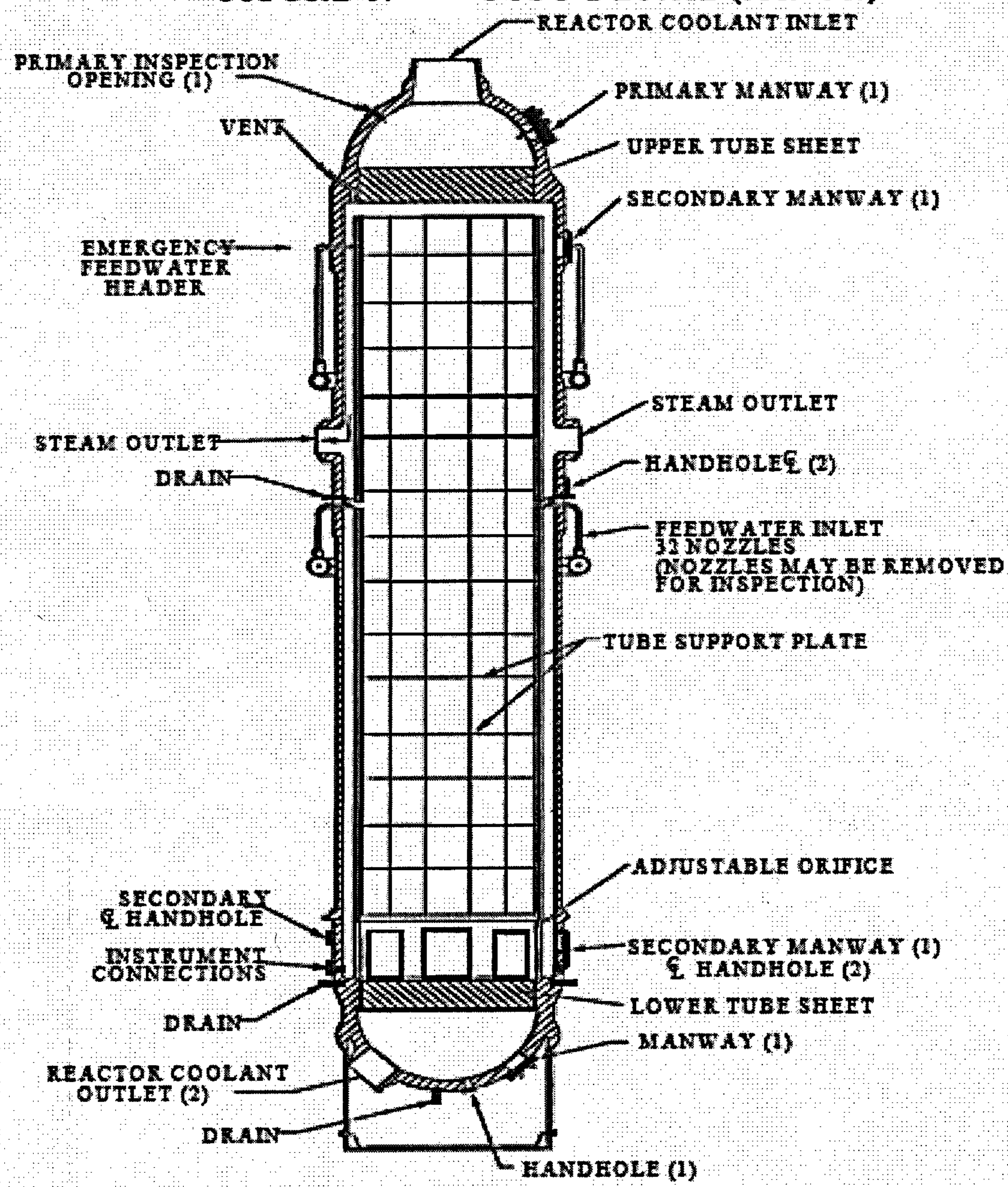


FIGURE 2 OTSG-SECONDARY FLOW PATH

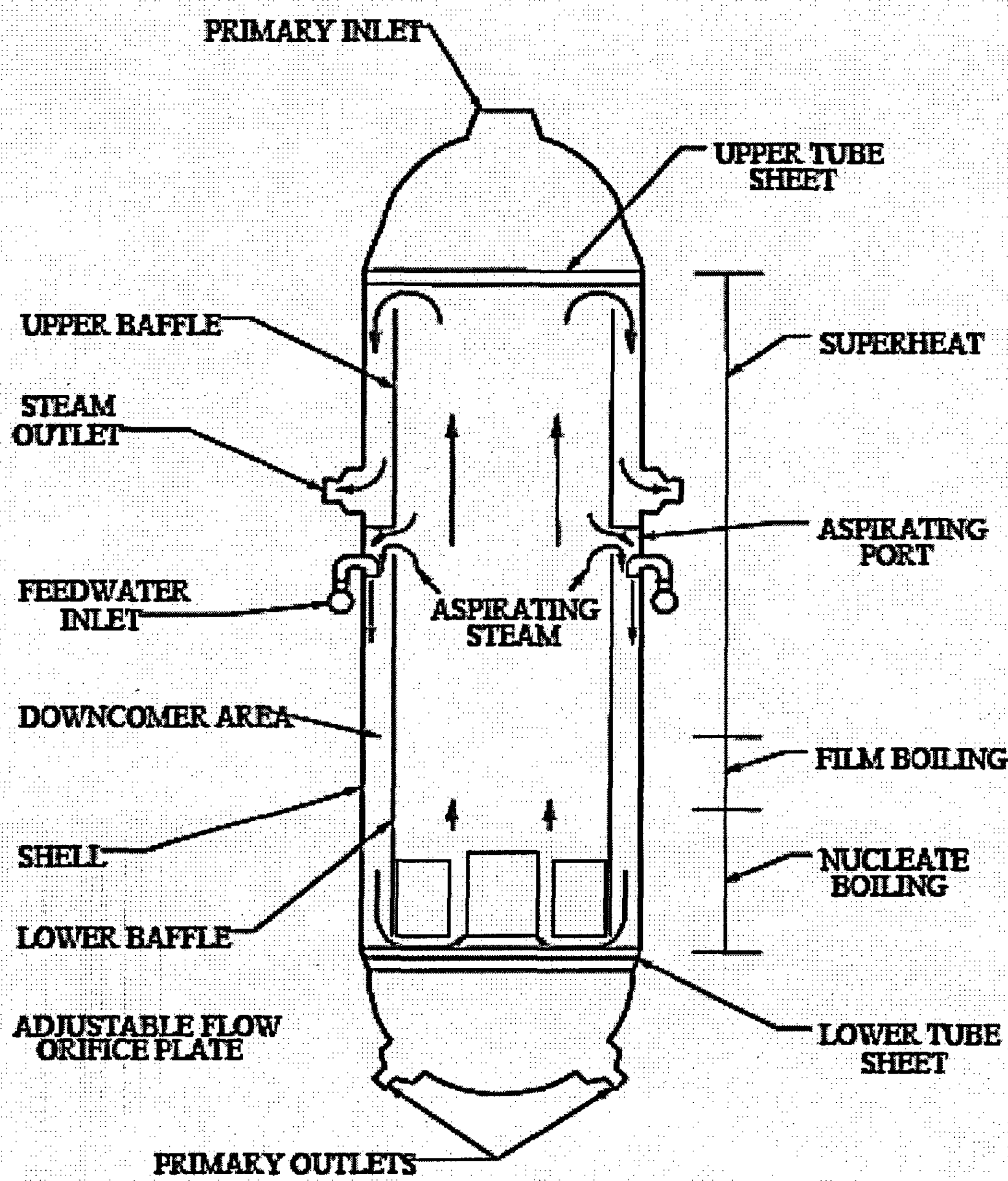


FIGURE 3

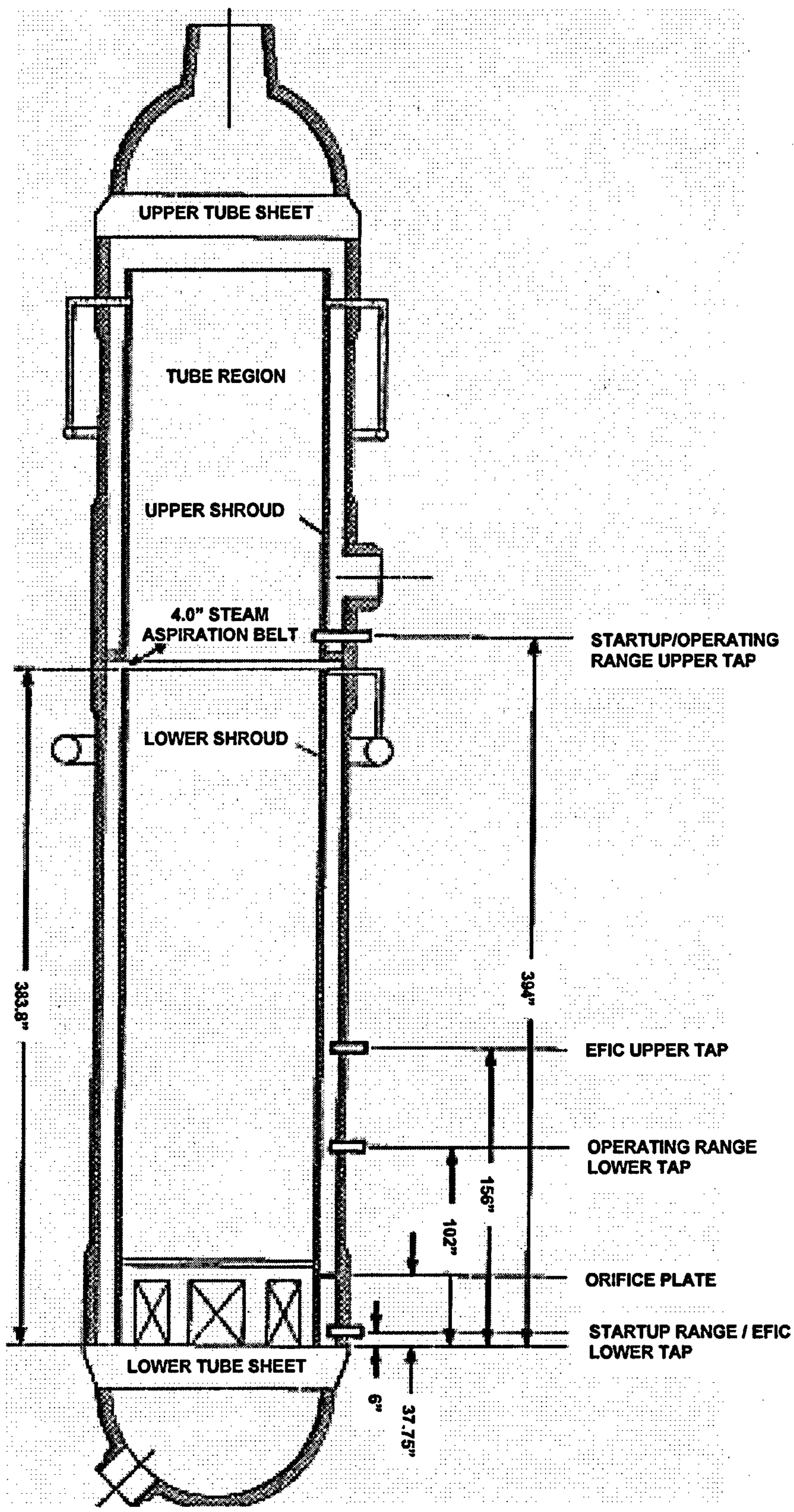
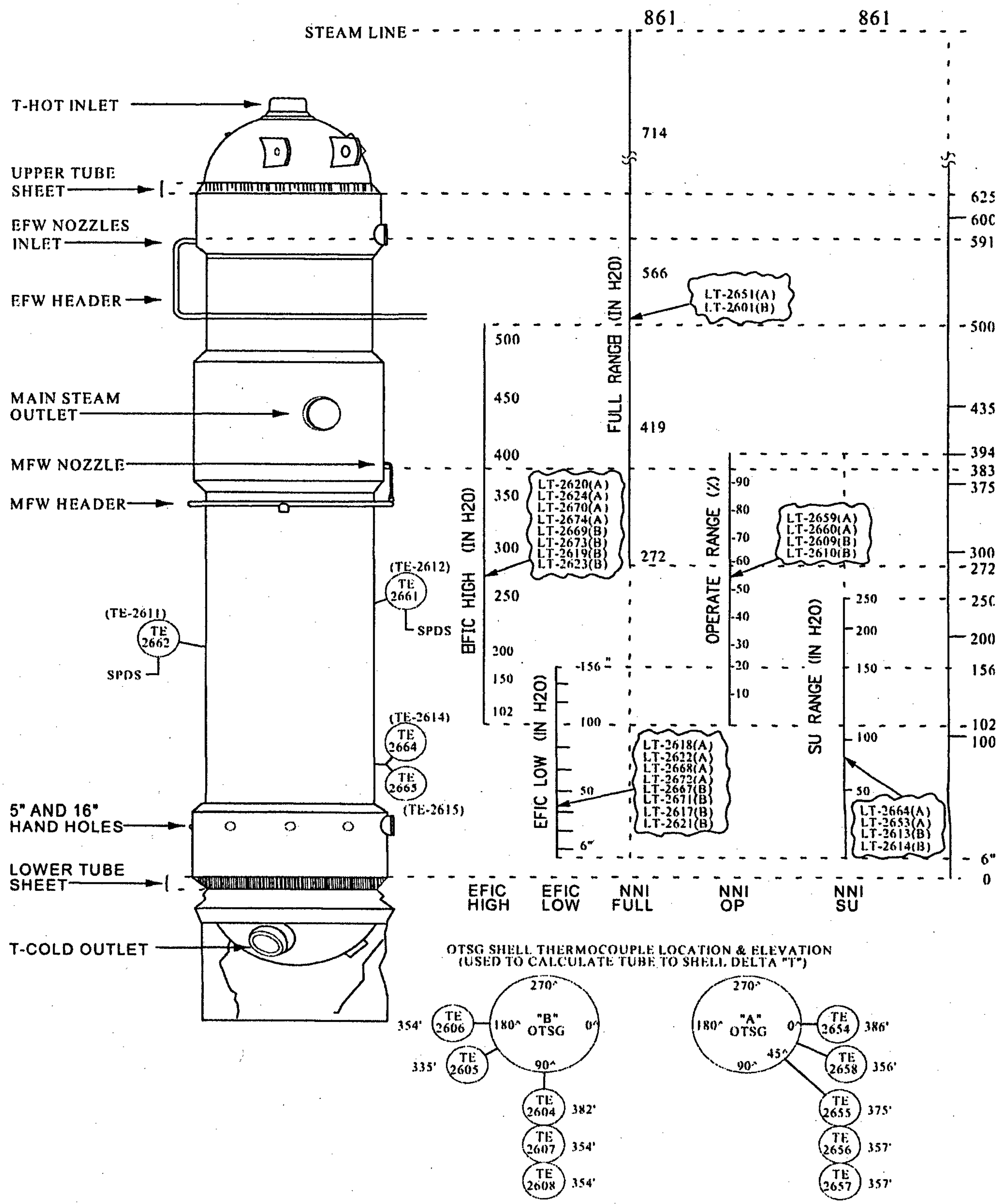

UPPER TUBE SHEET
TUBE REGION
UPPER SHROUD
4.0" STEAM ASPIRATION BELT
STARTUP/OPERATING RANGE UPPER TAP
LOWER SHROUD
383.8"
394"
EFIC UPPER TAP
OPERATING RANGE LOWER TAP
156"
102"
ORIFICE PLATE
STARTUP RANGE / EFIC LOWER TAP
LOWER TUBE SHEET
6"
37.75"

Figure 4


STEAM LINE
861
861
T-HOT INLET
UPPER TUBE SHEET
EFW NOZZLES INLET
EFW HEADER
MAIN STEAM OUTLET
MFW NOZZLE
MFW HEADER
5" AND 16" HAND HOLES
LOWER TUBE SHEET
T-COLD OUTLET
FULL RANGE (IN H2O)
EFIC HIGH (IN H2O)
EFIC LOW (IN H2O)
OPERATE RANGE (%)
SU RANGE (IN H2O)
LT-2651(A)
LT-2601(B)
LT-2620(A)
LT-2624(A)
LT-2670(A)
LT-2674(A)
LT-2669(B)
LT-2673(B)
LT-2619(B)
LT-2623(B)
LT-2659(A)
LT-2660(A)
LT-2609(B)
LT-2610(B)
LT-2618(A)
LT-2622(A)
LT-2668(A)
LT-2672(A)
LT-2667(B)
LT-2671(B)
LT-2617(B)
LT-2621(B)
LT-2664(A)
LT-2653(A)
LT-2613(B)
LT-2614(B)
(TE-2612)
TE 2661
SPDS
(TE-2611)
TE 2662
SPDS
(TE-2614)
TE 2664
TE 2665
(TE-2615)
EFIC HIGH
EFIC LOW
NNI FULL
NNI OP
NNI SU
OTSG SHELL THERMOCOUPLE LOCATION & ELEVATION
(USED TO CALCULATE TUBE TO SHELL DELTA "T")
"B" OTSG
"A" OTSG
TE 2606 354'
TE 2605 335'
TE 2604 382'
TE 2607 354'
TE 2608 354'
TE 2654 386'
TE 2658 356'
TE 2655 375'
TE 2656 357'
TE 2657 357'

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000

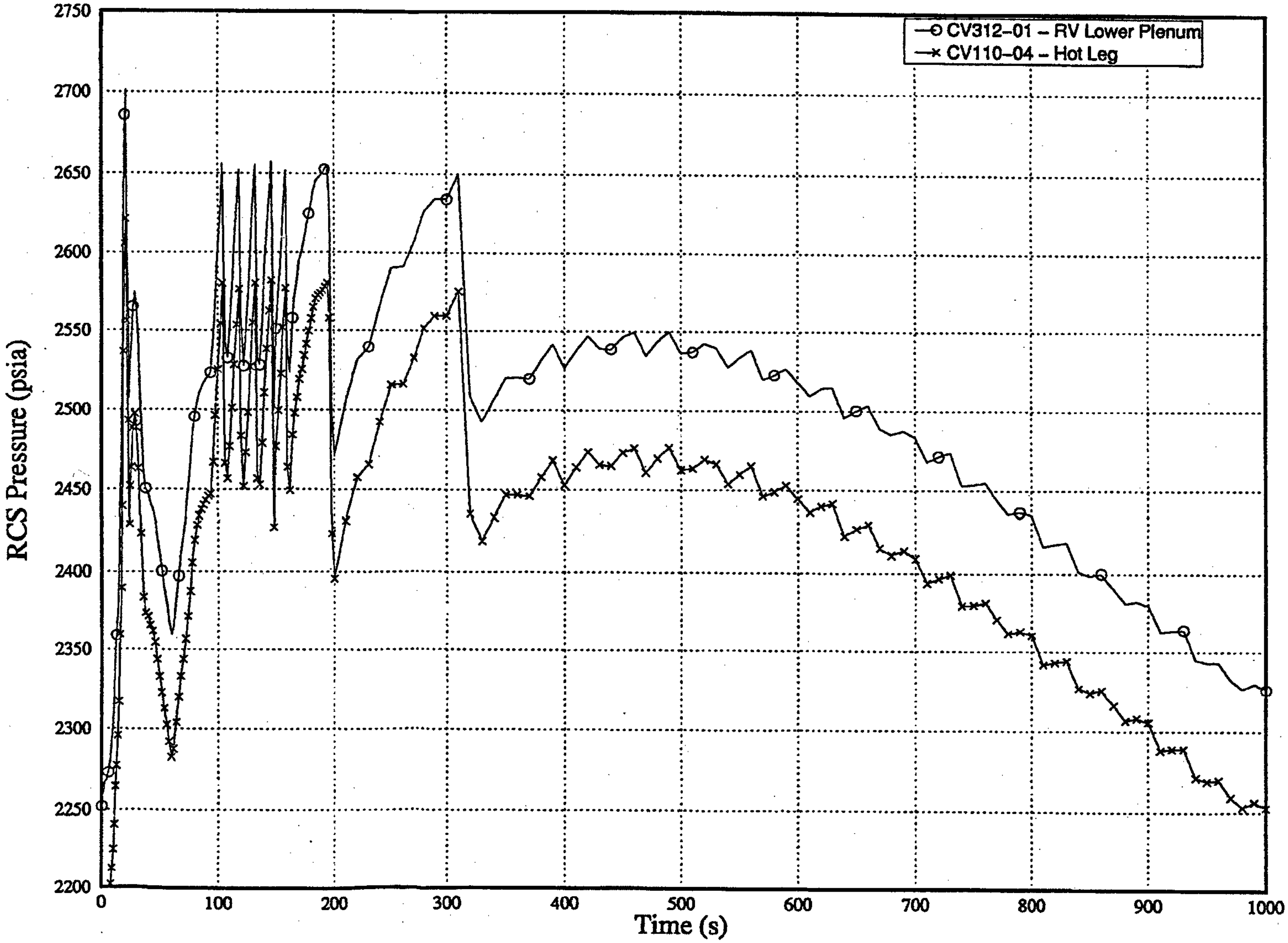


Figure 5

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000

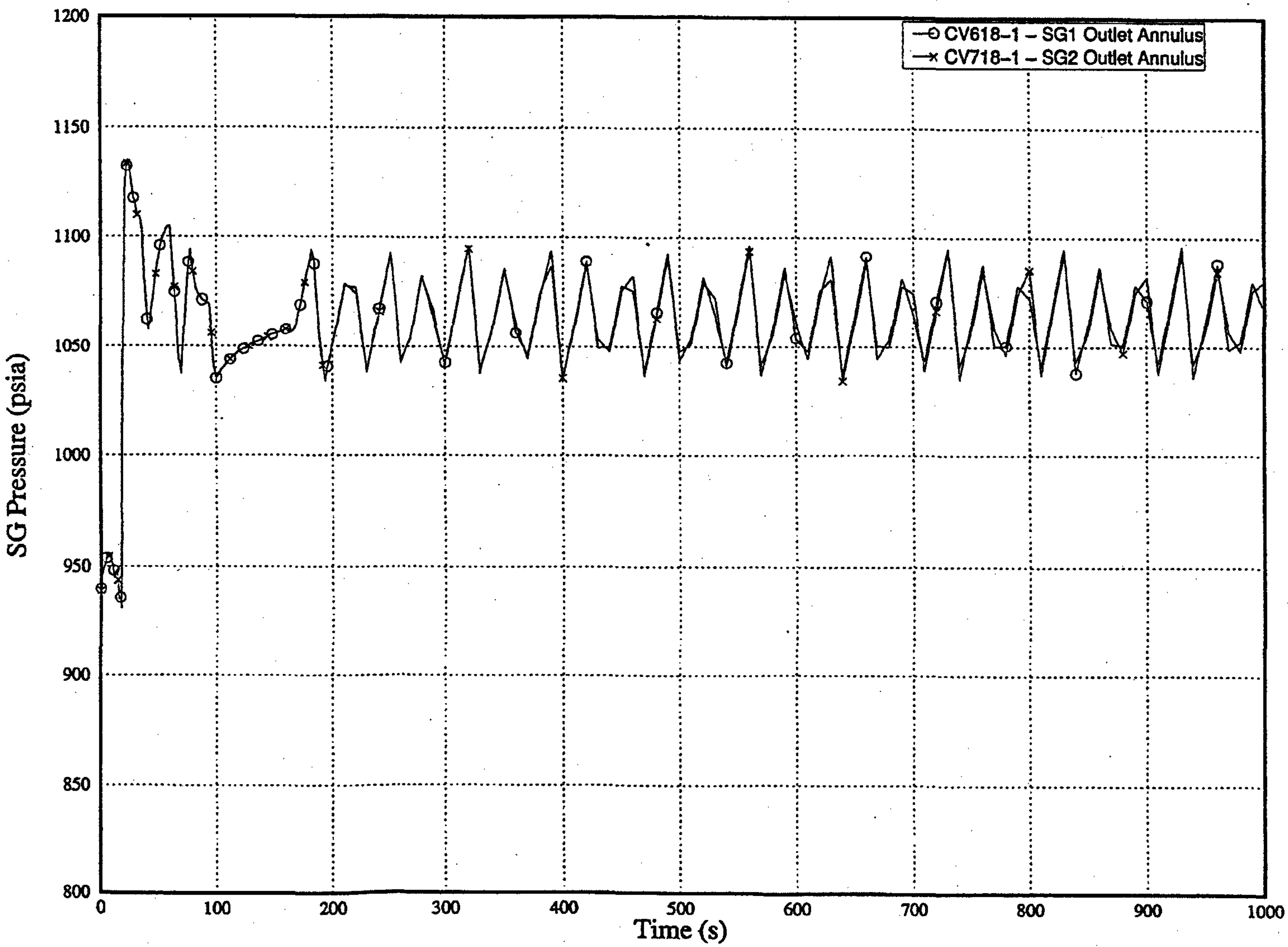


Figure 6

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000

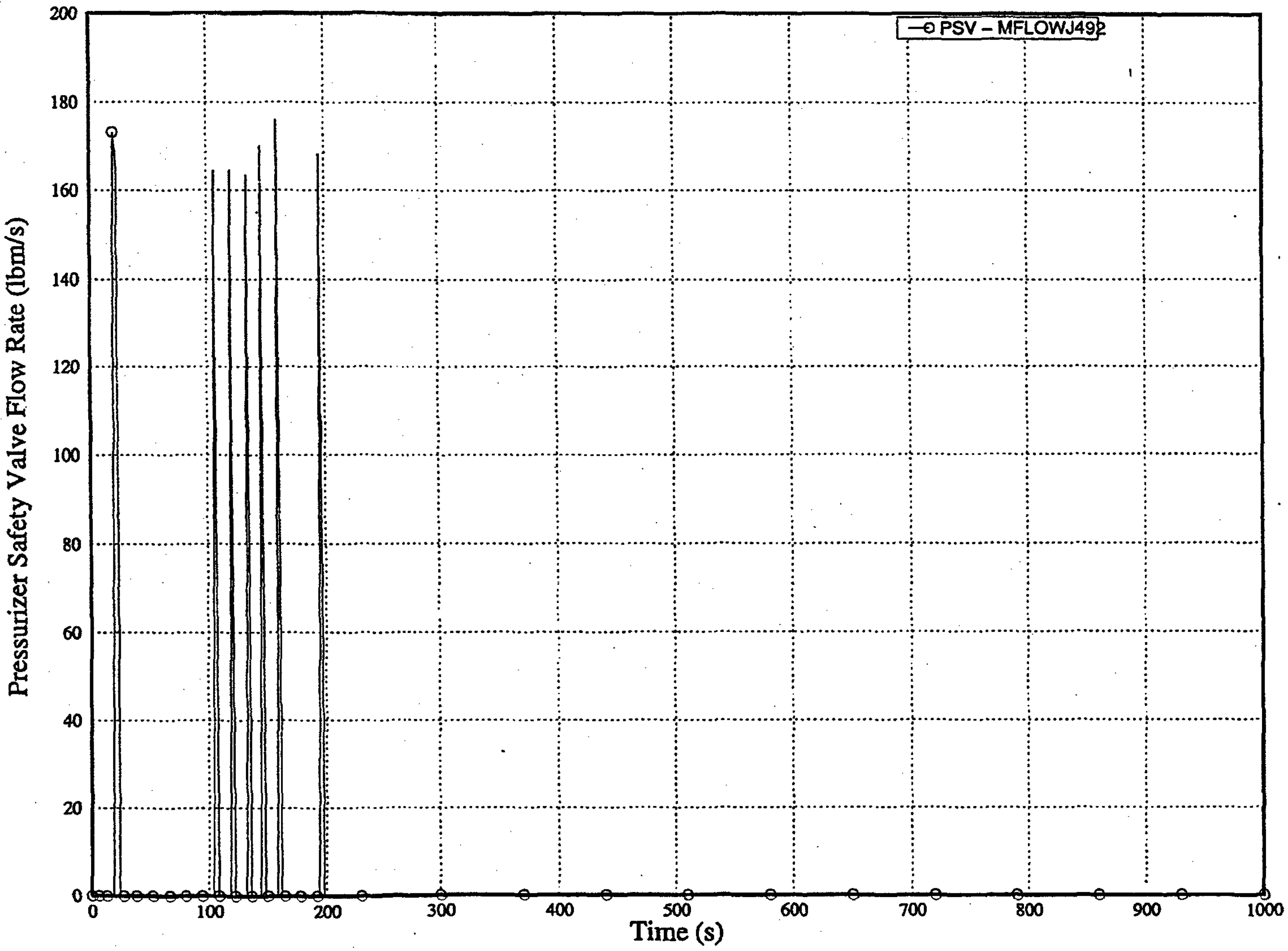


Figure 7

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000

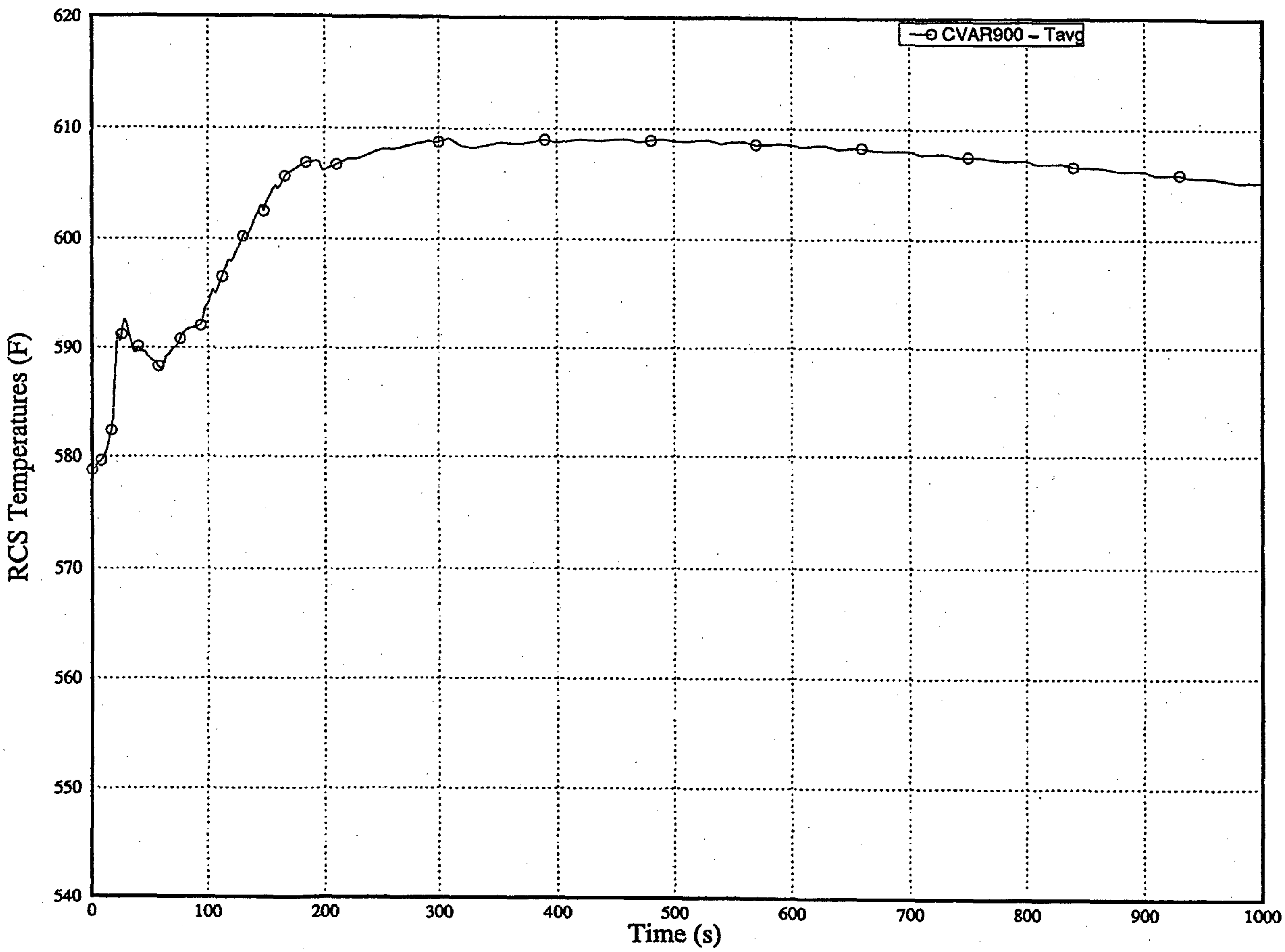


Figure 8

ANO-1 Loss of Main Feedwater Analysis – 86–9009698–000

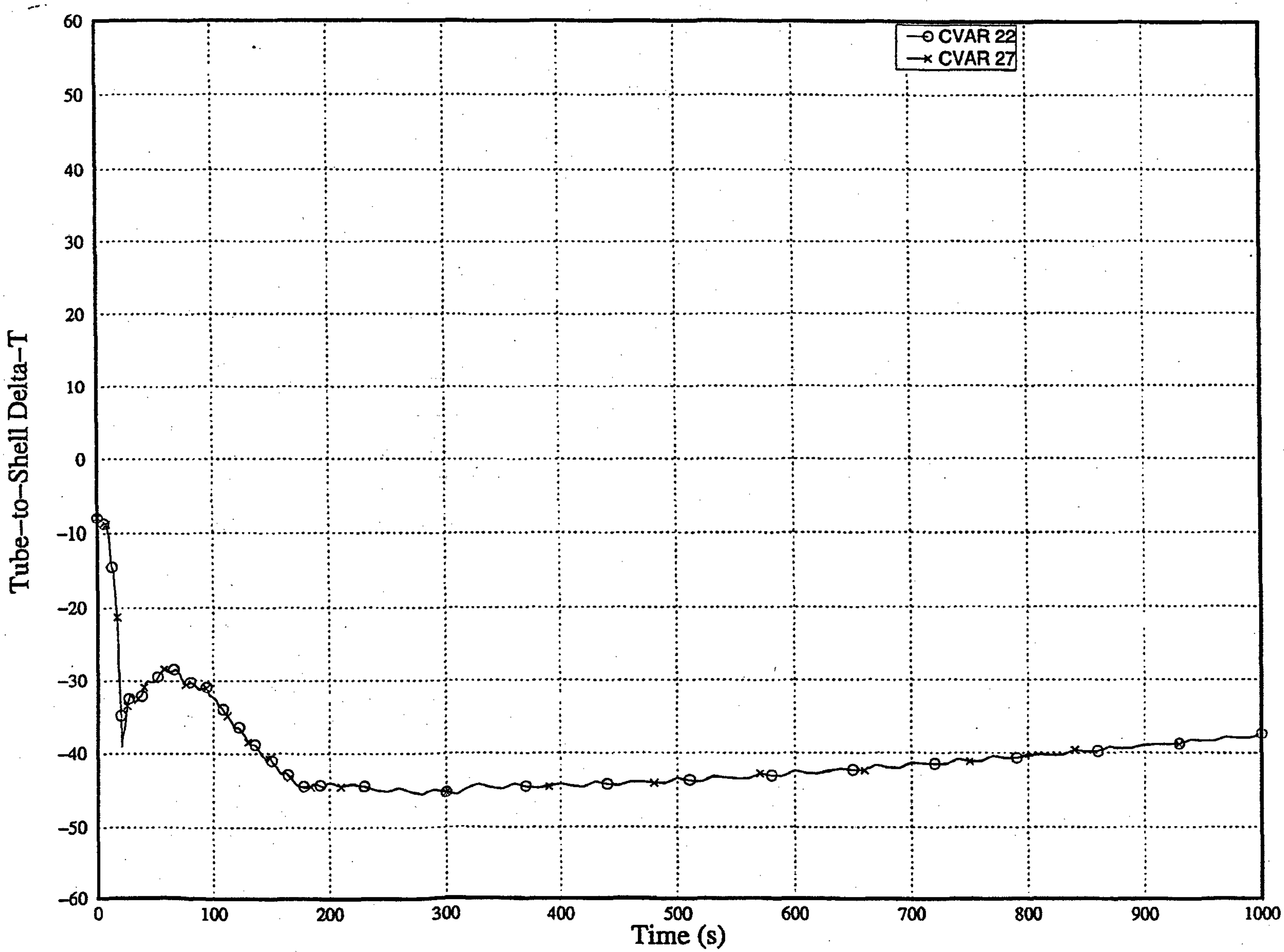


Figure 9

ANO-1 Loss of Main Feedwater Analysis – 86-9009698-000

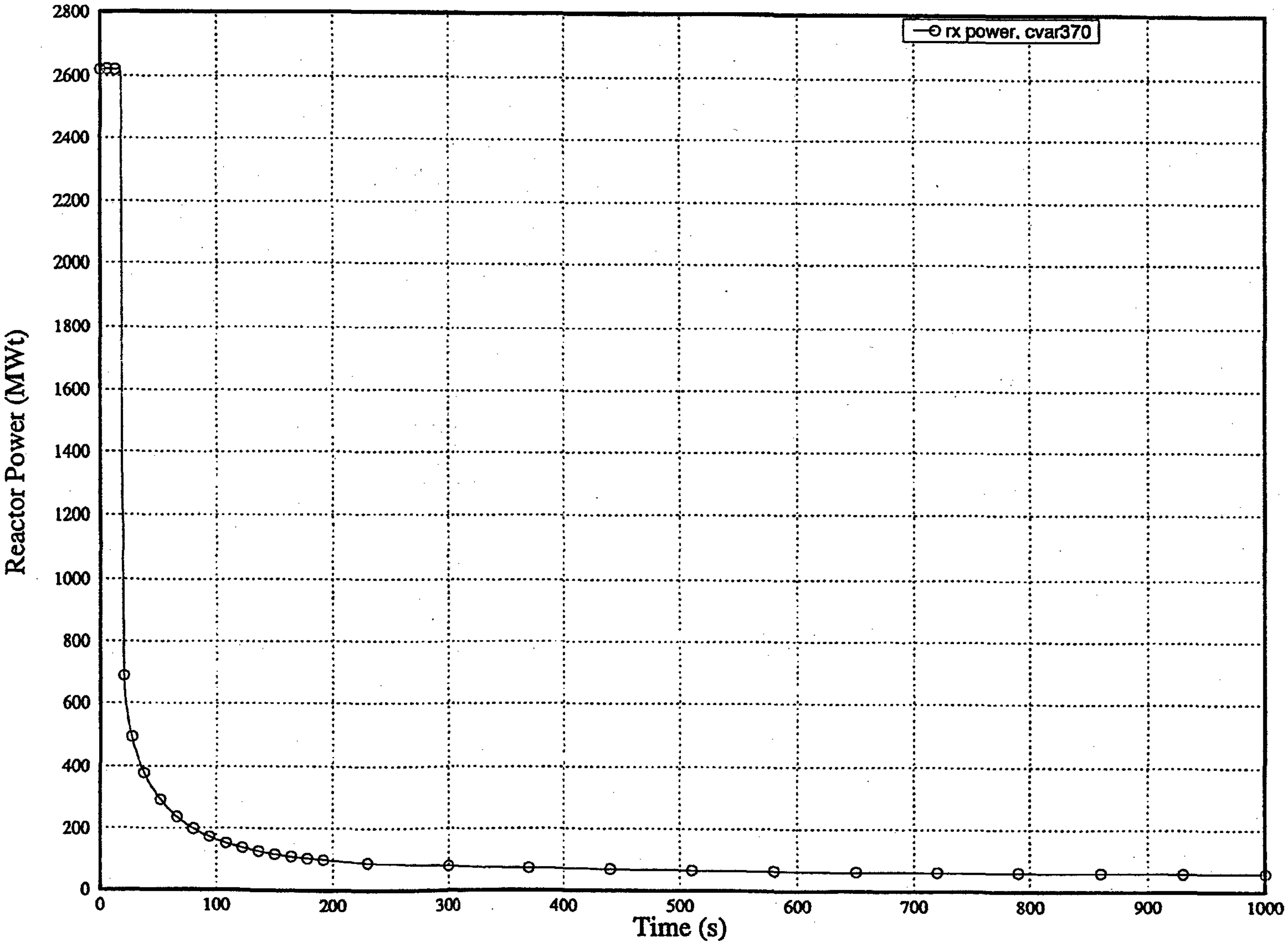


Figure 10

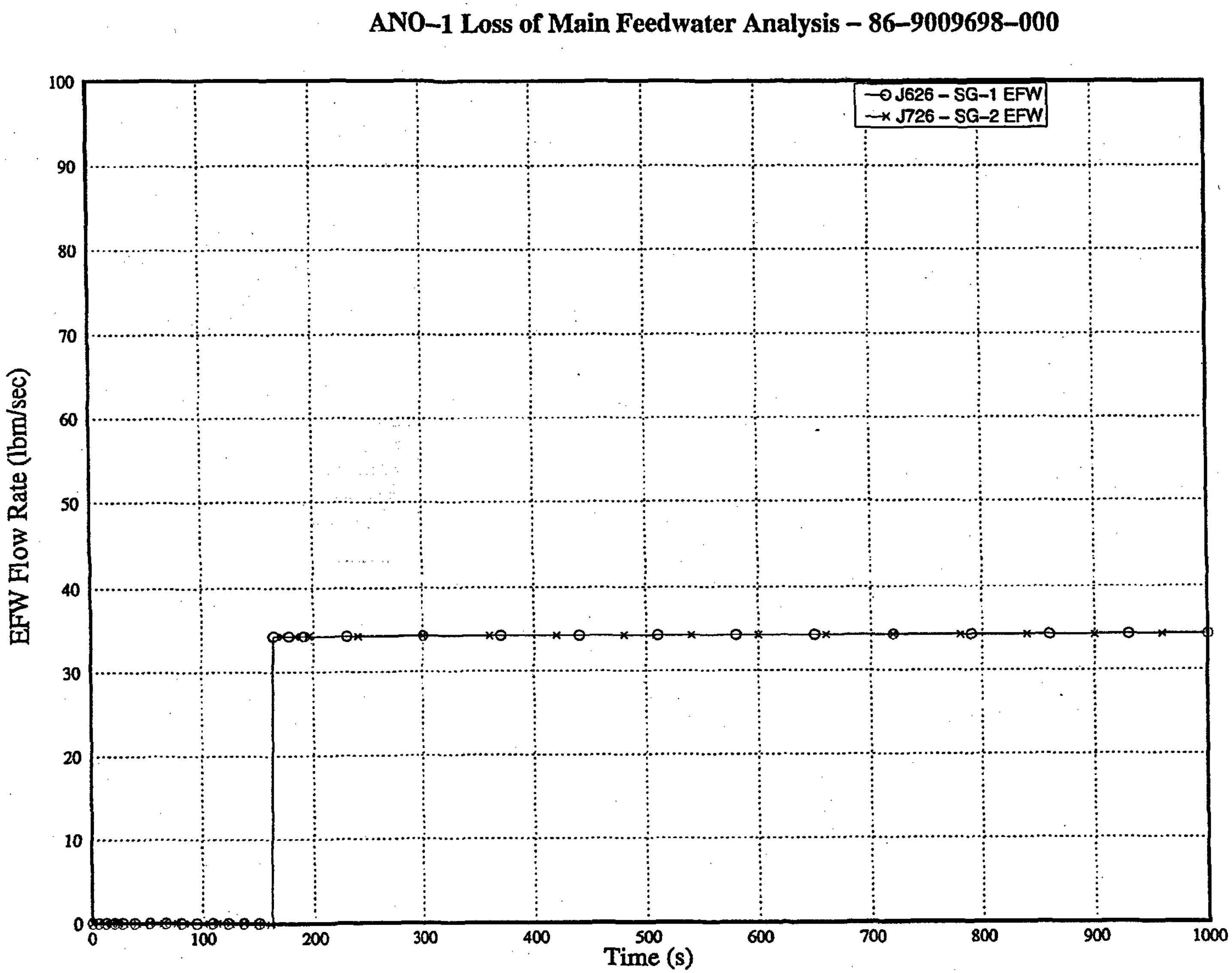

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000
J626 – SG–1 EFW
J726 – SG–2 EFW
EFW Flow Rate (lbm/sec)
Time (s)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
700
800
900
1000

Figure 11

ANO–1 Loss of Main Feedwater Analysis – 86–9009698–000

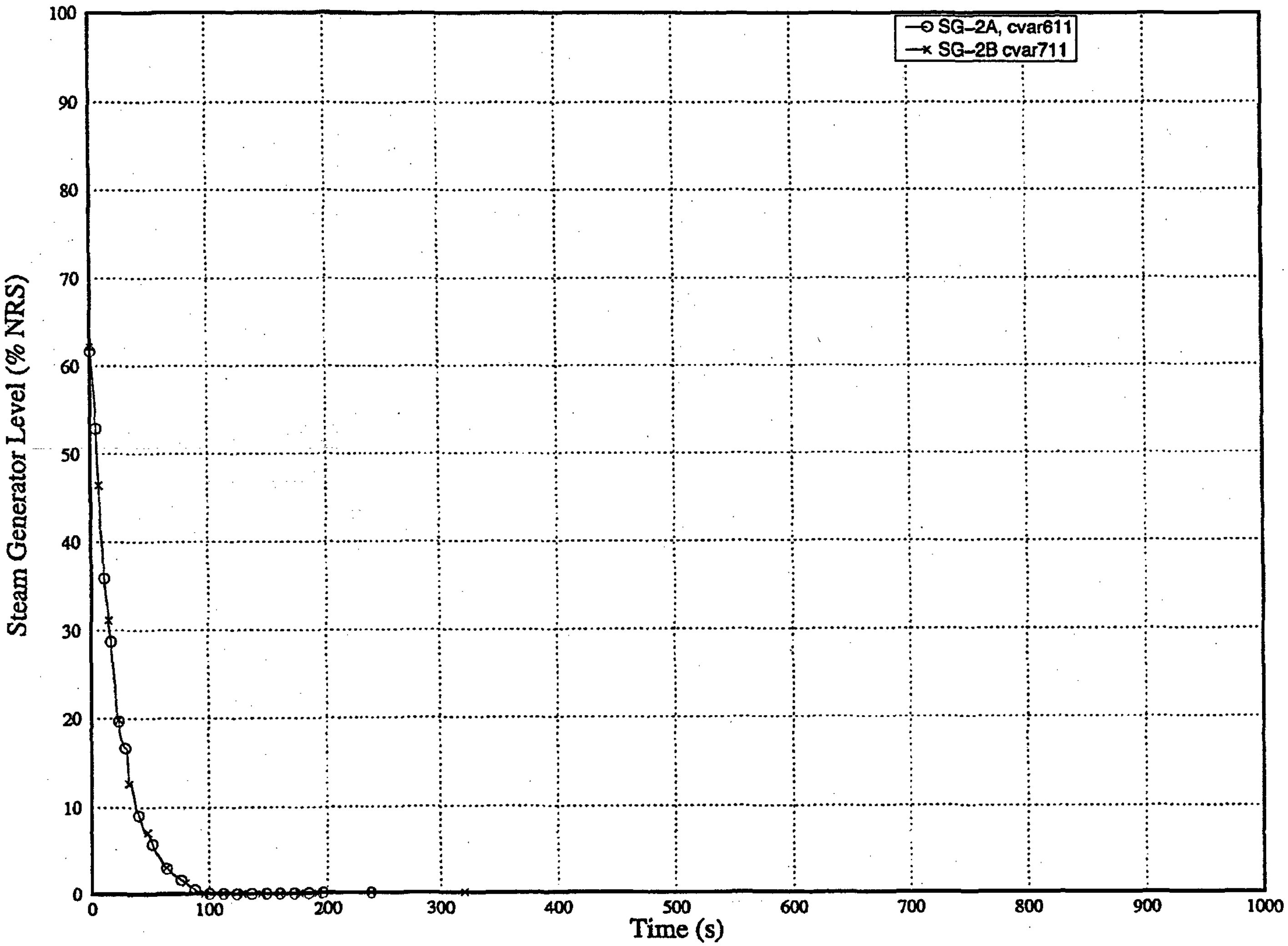


Figure 12

Attachment 2

To

1CAN010601

Proposed Technical Specification Changes (mark-up)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time not met for Function 1.a or 1.d.	E.1 Reduce THERMAL POWER to ≤ 10% RTP.	6 hours
F. Required Action and associated Completion Time not met for Functions 1.c, 2, or 3.	F.1 Be in MODE 3. AND F.2 Reduce steam generator pressure to < 750 psig.	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

---NOTE---
Refer to Table 3.3.11-1 to determine which SRs shall be performed for each EFIC Function.

SURVEILLANCE		FREQUENCY
SR 3.3.11.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.11.2	Perform CHANNEL FUNCTIONAL TEST. (Notes 1 & 2)	31 days
SR 3.3.11.3	Perform CHANNEL CALIBRATION. (Notes 1 & 2)	18 months

The following notes apply only to the SG Level – Low function:

Note 1: If the as-found channel setpoints are conservative with respect to the Allowable Value but outside their predefined as-found acceptance criteria band, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service. If the as-found instrument channel setpoints are not conservative with respect to the Allowable Value, the channel shall be declared inoperable.

Note 2: The instrument channel setpoint(s) shall be reset to a value that is within the as-left tolerance of the Limiting Trip Setpoint, or a value that is more conservative than the Limiting Trip Setpoint; otherwise, the channel shall be declared inoperable. The Limiting Trip Setpoint and the methodology used to determine the Limiting Trip Setpoint, the predefined as-found acceptance criteria band, and the as-left setpoint tolerance band are specified in the Bases.

Table 3.3.11-1
Emergency Feedwater Initiation and Control System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUES
1. EFW Initiation				
a. Loss of MFW Pumps (Control Oil Pressure)	≥ 10% RTP	4	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 55.5 psig
b. SG Level - Low	1,2,3	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ ~~11.1~~ 9.34 inches[c,d]
c. SG Pressure - Low	1,2,3[a]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig
d. RCP Status	≥ 10% RTP	4	SR 3.3.11.1 SR 3.3.11.2	NA
2. EFW Vector Valve Control				
a. SG Pressure – Low	1,2,3[a]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig
b. SG Differential Pressure – High	1,2,3[a]	4	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≤ 150 psid
3. Main Steam Line Isolation				
a. SG Pressure – Low	1,2,3[a][b]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig

(a) When SG pressure ≥ 750 psig.

(b) Except when all associated valves are closed and deactivated.

(c) The SG Level – Low "Limiting Trip Setpoint" in accordance with NRC letter dated September 7, 2005, *Technical Specification For Addressing Issues Related To Setpoint Allowable Values*, is ≥ 10.42 inches.

(d) Includes an actuation time delay of ≤ 10.4 seconds.

Attachment 3

To

1CAN010601

Proposed Technical Specification Bases Changes Mark-Up
(For Information Only)

BACKGROUND (continued)

Trip Setpoints and Allowable Values

The trip setpoints are the values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.

The trip setpoints used in the bistables are based on the analytical limits stated in SAR, Chapters 7 and 14 (Refs. 2 and 3). The selection of these trip setpoints is such that adequate protection is provided when appropriate sensor and processing time delays are taken into account.

For all EFIC functions except the SG Level – Low function, t~~T~~he Allowable Values are Limiting Safety System Settings (LSSS) required by 10 CFR 50.36 and are conservatively adjusted with respect to the analytical limits to allow for calibration tolerances, instrumentation uncertainties, instrument drift, and environmental errors as required.

For the SG Level – Low function, The "limiting trip setpoint" is the LSSS required by 10 CFR 50.36 and includes additional uncertainties such as drift, calibration uncertainty, and uncertainties determined during normal operation.. The Limiting Trip Setpoint also provides a means to identify unacceptable instrument performance that may require corrective action.

Guidance used to calculate the uncertainties associated with the Allowable Values and, the Limiting ~~T~~trip S~~s~~etpoint for the SG Level – Low function,~~s~~ is provided in Instrument Loop Error Analysis and Setpoint Methodology Manual Design Guide, IDG-001 (Ref. 4). The methodology is consistent with Method 3 of ISA-RP67.04.02-2000, *Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation.* The explicit uncertainties are addressed in the design calculations as required. The trip setpoint entered into the bistable may be more conservative than that specified by the Allowable Value to account for changes in instrument error detectable by a CHANNEL FUNCTIONAL TEST. A channel is inoperable if its as-found trip setpoint is not within its required Allowable Value.

Setpoints in accordance with the Allowable Value in conjunction with the LCOs and administrative controls ensure that the consequences of Design Basis Accidents (DBAs) are acceptable, providing the unit is operated from within the LCOs at the onset of the DBA, and that the equipment functions as analyzed.

Each channel can be tested on line to verify that the trip setpoint is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal can be injected in place of the field instrument signal. The process equipment for the channel in test can then be tested, verified, and calibrated.

LCO

All instrumentation performing an EFIC System Function in Table 3.3.11-1 shall be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable.

Four channels are required OPERABLE for all EFIC Functions. Each EFIC instrumentation channel is considered to include the sensors and measurement channels for each Function, the operational bypass switches, and permissives. Failures that disable the capability to place a channel in operational bypass, but which do not disable the trip Function, do not render the protection channel inoperable.

EFIC initiation function values for the bypass removal functions are specified in terms of applicability limits (i.e., identified in the Applicable MODES or Other Specified Conditions column of Table 3.3.11-1) for the associated trip Function. Trip setpoints are specified in the setpoint calculations or calibration procedures. The trip setpoints are selected to ensure the setpoints measured by CHANNEL FUNCTIONAL TESTS do not exceed the Allowable Value if the bistable is performing as required. Guidance used to calculate the uncertainties associated with the trip setpoints is provided in Reference 4.

The Bases for the LCO requirements of each specific EFIC Function are discussed next.

Loss of MFW Pumps

Four EFIC channels for Loss of MFW Pumps shall be OPERABLE. This ensures that upon the loss of both MFW pumps, EFW will be automatically initiated. This Function is provided as a direct digital input from the RPS and includes a bypass enable and removal function.

SG Level – Low

Four EFIC dedicated low range level transmitters per SG shall be OPERABLE with an SG Level - Low actuation Allowable Value of ≥ 9.34~~11.1~~ inches, to generate the signals used for detection for low level conditions for EFW Initiation. This parameter is referenced to the top of the lower tube sheet and includes consideration for instrumentation error and an allowance for margin. Allowances for instrument drift and ~~additional~~ margin are included in the Limiting T~~t~~rip S~~s~~etpoint of ≥ 10.42 inches. A maximum time delay of 10.4 seconds is included in the analysis to preclude inadvertent EFW actuation due to short-lived SG level transients such as Main Feedwater pump transients, Turbine Trip, etc. There is one transmitter for each of the four channels A, B, C, and D. The signals are also used after EFW is actuated to control level at approximately 31 inches when one or more RCPs are in operation. In the determination of the low level setpoint, it is desired to place the setpoint as low as possible, considering instrument errors, to give the maximum operational margin between the integrated control system setpoint and the EFW Initiation setpoint. This will minimize spurious or unwanted initiation of EFW. Credit is only taken for low level actuation for those transients which do not involve a degraded environment. Therefore, normal environment errors only are used for determining the SG Level - Low ~~level~~ setpoint. This parameter is referenced to the top of the lower tube sheet.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.11.1 (continued)

The Frequency is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.11.2

A CHANNEL FUNCTIONAL TEST verifies the function of the automatic bypass removal feature, required trip, interlock, and alarm functions of the channel. Setpoints for trip functions must be found within the Allowable Value. (Note that the values for the bypass removal functions are identified in the Applicable MODES or Other Specified Condition column of Table 3.3.11-1 as limits on applicability for the trip Functions.) Any setpoint adjustment shall be consistent with the assumptions of the current setpoint analysis.

The Frequency of 31 days is based on unit operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given function in any 31 day interval is a rare event.

This SR is modified by two notes. For the SG Level – Low function, if the as-found trip setpoint is found to be non-conservative with respect to the Allowable Value specified in TSs, the channel is declared inoperable and the associated TS action statement must be followed. If the as-found trip setpoint is found to be conservative with respect to the Allowable Value and outside the as-found predefined acceptance criteria band of ± 1.08 inches, but is determined to be functioning as required and can be reset to within the setting tolerance of the Limiting Trip Setpoint or a value more conservative than the Limiting Trip Setpoint, then the channel may be considered to be operable. If it cannot be determine that the instrument channel is functioning as required, the channel is declared inoperable and the associated TS actions must be followed. If the as-found trip setpoint is outside the as-found predefined acceptance criteria band, the condition must be entered into the corrective action program for further evaluation. The as-left setpoint tolerance band is 0.975 inches. The notes for the Channel Functional Test do not apply to the verification of the time delay.

SR 3.3.11.3

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The test verifies the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channels adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the setpoint analysis. The notes contained in SR 3.3.11.2 are also applicable to the CHANNEL CALIBRATION.